Queensland

2004 air monitoring report

This report fulfils the annual reporting requirements for Queensland under clause 18 of the National Environment Protection (Ambient Air Quality) Measure

Environment technical report No. 57

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Summary

Air monitoring at National Environment Protection (Ambient Air Quality) Measure (AAQ NEPM) monitoring stations in Queensland between January and December 2004 indicated that:

Exceedences of the AAQ NEPM standards occurred for:

- 1-hour and 4-hour ozone at the Flinders View site in south-east Queensland due to the combination of favourable meteorological conditions and added emissions of ozone precursor compound from bushfires;
- 1-hour and 24-hour sulfur dioxide at the Menzies site in Mount Isa due to industrial emissions; and
- 24-hour PM_{10} at the Mountain Creek site in south-east Queensland due to windblown dust, the Rocklea site in south-east Queensland due to smoke from a hazard-reduction burn and a fire in a nearby industrial premises, the Flinders View site in south-east Queensland due to bushfire smoke and the North Toowoomba site due to solid fuel heater emissions.

The AAQ NEPM 2008 goal was met in all regions during 2004, with the exception of:

- 1-hour ozone at the Flinders View site in south-east Queensland due to bushfire emissions; and
- 1-hour sulfur dioxide at the Menzies site in Mount Isa due to industrial emissions.

Compliance with the standards and the 2008 goal could not be demonstrated at the Brisbane CBD, Targinie, Stuart and Pimlico monitoring stations because data availability was below the level required to make a valid assessment. There were no exceedences of standards in the available measurement data from these four stations.

$PM_{2.5}$ levels greater than the AAQ NEPM 24-hour advisory reporting standard (measured using continuous TEOM instrumentation) occurred on five days at the Rocklea site in south-east Queensland due to bushfire smoke and once at the North Toowoomba site due to emissions from a localised fire.

Implementation of monitoring in Townsville (ozone, nitrogen dioxide and PM_{10}) has proceeded more slowly than the timeframes contained in the Queensland AAQ NEPM ambient air monitoring plan due to delays in obtaining siting approvals. Scheduled campaign monitoring in Mackay (ozone and nitrogen dioxide), Cairns (ozone, nitrogen dioxide and PM_{10}), Rockhampton (ozone, nitrogen dioxide, sulfur dioxide and PM_{10}) and Bundaberg (ozone, nitrogen dioxide and PM_{10}) has been deferred pending the results of campaign monitoring in Townsville and AAQ NEPM Peer Review Committee modelling studies.

Introduction

Under clause 18 of the AAQ NEPM, jurisdictions are required to submit an annual report on their compliance with the measure in an approved form by the end of June of the year following the reporting year. The National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 8, "Annual Reports" (available from *www.ephc.gov.au*) details the format and data requirements of the annual report.

This report documents compliance information for Queensland for 2004 in accordance with the requirements of technical paper No. 8. The report is divided into four sections as follows:

Section A: Overview of the AAQ NEPM monitoring network and related activities during 2004.

Section B: Assessment of compliance with the AAQ NEPM Standards and Goals.

Section C: Assessment of monitoring data against the standards (including details of exceedences and the circumstances which led to these exceedences, and information on the highest values measured for all pollutants and regions).

Section D: Data analysis (including pollutant distribution summaries and selected multi-year data for trend stations).

Additional information on the circumstances which led to exceedences of standards during 2004 are provided in an appendix.

Section A – Monitoring summary

Queensland's ambient air monitoring plan (available from *www.epa.qld.gov.au/environmental_management/air/air_quality_monitoring/national_measures*) outlines the monitoring to be undertaken in Queensland to determine compliance with the Standards and 2008 Goal of the AAQ NEPM. It should be noted that this monitoring is only a part of the overall air monitoring network operated by the EPA. Details of AAQ NEPM monitoring and related activities in Queensland during 2004 follow.

Current AAQ NEPM monitoring stations

During 2004 monitoring was conducted in six of the ten regions identified in the Queensland monitoring plan – south-east Queensland (consisting of four sub-regions), Toowoomba, Gladstone, Mackay, Townsville and Mount Isa. Monitoring site locations are shown in figure 1.

Table 1 contains a descriptive summary of each monitoring site. In line with the descriptions contained in the AAQ NEPM, sites are identified as:

- Performance monitoring station (PMS) – nominated location to measure achievement against the goal of the AAQ NEPM.
- Trend station – nominated location to measure long-term changes in air quality in addition to achievement against the goal of the AAQ NEPM.
- Campaign station – short-term investigation location (operational for a minimum of one calendar year) to assess the need for ongoing monitoring in the region to measure achievement against the goal of the AAQ NEPM.

Sites are further characterised using the population coverage descriptors contained in the National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 3, "Monitoring Strategy" (available from *www.ephc.gov.au*):

- Generally representative upper bound (GRUB) – indicative of pollutant concentrations in the upper range of levels occurring in populated areas in the region.
- Population-average – indicative of air quality experienced by most of the population.

Exposed population is a qualitative measure of the population density in the vicinity of the monitoring station.

Figure 1: 2004 AAQ NEPM monitoring station locations

Table 1: 2004 Queensland AAQ NEPM monitoring sites

Site	Station type	Established	Pollutants monitored	Monitoring techniques	Exposed population	Non-conformance with AS2922 siting criteria	Major pollutant sources
South-east Queensland *North Coast sub-region*							
Mountain Creek	PMS - GRUB	July 2001	Ozone Nitrogen dioxide PM_{10}	AS3580.6.1-1990 AS3580.5.1-1993 AS3580.9.8-2001	Medium	Nil	Major roads Forestry/agricultural burning
Brisbane sub-region							
Deception Bay	Trend - GRUB	June 1994	Ozone Nitrogen dioxide	AS3580.6.1-1990 AS3580.5.1-1993	Medium	Trees within 20m west of site	Major roads
Brisbane CBD (closed November 2004)	Trend - GRUB	April 1998	Carbon monoxide	AS3580.7.1-1992	High	Height above ground (10m) Clear sky angle <120deg	Major roads
Woolloongabba	Trend – Peak	June 1998	Carbon monoxide	AS3580.7.1-1992	High	Nil	Major roads
Rocklea	Trend - GRUB	April 1994	Ozone Nitrogen dioxide PM_{10} $PM_{2.5}$ $PM_{2.5}$	AS3580.6.1-1990 AS3580.5.1-1993 AS3580.9.8-2001 Reference method (Partisol sequential air sampler) TEOM, based on	High	Nil	Major roads
Springwood	PMS - population average	March 1999	Ozone Nitrogen dioxide Sulfur dioxide PM_{10} $PM_{2.5}$ $PM_{2.5}$	DOAS DOAS DOAS AS3580.9.8-2001 Reference method (Partisol sequential air sampler) TEOM, based on	High	Nil	Major roads

Table 1: 2004 Queensland AAQ NEPM monitoring sites (continued)

Site	Station type	Established	Pollutants monitored	Monitoring techniques	Exposed population	Non-conformance with AS2922 siting criteria	Major pollutant sources
South-east Queensland *North Coast sub-region*							
Flinders View	Trend - GRUB	January 1993	Ozone Nitrogen dioxide Sulfur dioxide PM_{10}	AS3580.6.1-1990 AS3580.5.1-1993 AS3580.4.1-1990 AS3580.9.8-2001	Medium	Trees within 20m of site (kept pruned below inlet height)	Major roads Industry (power generation)
Toowoomba							
North Toowoomba	Campaign - GRUB	July 2003	Carbon monoxide Ozone Nitrogen dioxide PM_{10} $PM_{2.5}$	AS3580.7.1-1992 AS3580.6.1-1990 AS3580.5.1-1993 AS3580.9.8-2001 TEOM. Based on AS3580.9.8-2001	High	Nil	Major roads Solid fuel heaters
Gladstone							
South Gladstone	Trend - GRUB	July 1992	Nitrogen dioxide Sulfur dioxide PM_{10}	AS3580.5.1-1993 AS3580.4.1-1990 AS3580.9.8-2001	Medium	Trees within 20m to north-west of site	Major roads Industry (power generation, metals processing)
Targinie	Campaign - GRUB	December 2000	Ozone	DOAS	Low	Trees within 20m of DOAS light path	Industry (cement manufacture, metals processing, petroleum
Mackay							
West Mackay	PMS - GRUB	September 1997	PM_{10}	AS3580.9.8-2001	Medium	Nil	Agricultural burning

Table 1: 2004 Queensland AAQ NEPM monitoring sites (continued)

Site	Station type	Established	Pollutants monitored	Monitoring techniques	Exposed population	Non-conformance with AS2922 siting criteria	Major pollutant sources
Townsville							
Pimlico	Campaign – population average	May 2004	Ozone Nitrogen dioxide PM_{10}	AS3580.6.1-1990 AS3580.5.1-1993 AS3580.9.8-2001	High	Nil	Major roads Industry (metals processing, port operations)
Stuart	Campaign - GRUB	September 2001	Sulfur dioxide	AS3580.4.1-1990	Low	Nil	Industry (metals processing)
Mount Isa							
Menzies	Trend - GRUB	January 1983	Sulfur dioxide	AS3580.4.1-1990	Low	Tress within 20m of site (kept pruned below inlet height)	Industry (metals smelting, sulfuric acid manufacture)

Implementation Activities

The EPA has continued to expand its ambient air monitoring activities in regional centres. Expansion activities during 2004 included commencement of ozone, nitrogen dioxide and PM_{10} monitoring in Townsville in May 2004. The new station is located at Pimlico, a residential suburb approximately 5km south-west of the city centre. The station's location will provide a measure of typical ambient pollutant concentrations experienced by the general population from traffic, industry and domestic sources in the region.

In July 2004 $PM_{2.5}$ monitoring using reference samplers on a one in three day basis commenced at the Rocklea and Springwood sites in south-east Queensland as required under the AAQ NEPM $PM_{2.5}$ Equivalence Program. $PM_{2.5}$ tapered element oscillating microbalance (TEOM) instruments at these two sites were modified to conform with $PM_{2.5}$ Equivalency Program requirements in December 2003.

Variations to the approved monitoring plan for Queensland

Delays in the establishment of monitoring in other centres, commitments under the AAQ NEPM $PM_{2.5}$ Equivalency Program and other resource constraints have meant that it has not been possible to begin monitoring in Cairns, Mackay, Rockhampton and Bundaberg according to the timeframes set out in the monitoring plan for Queensland.

The need for campaign monitoring of ozone and nitrogen dioxide in Cairns, Mackay, Rockhampton and Bundaberg will be assessed based on the results of campaign monitoring in Townsville and the outcome of modelling studies commissioned by the AAQ NEPM Peer Review Committee.

The Brisbane CBD monitoring station was closed in November 2004 as the building housing the monitoring equipment was to be refurbished. With the closure of the Brisbane CBD site, measurement data from the EPA's Woolloongabba monitoring station will now be used for reporting against the AAQ NEPM carbon monoxide standard for south-east Queensland. The Woolloongabba station is located adjacent to a major inner-city traffic corridor. Measurements at this site are indicative of the highest ambient carbon monoxide concentrations residents of south-east Queensland would be exposed to. Carbon monoxide data have been collected at the Woolloongabba site since mid-1998 and trend information for this period has been included in this report.

Section B – Assessment of compliance with standards and 2008 goal

This section provides details of the annual compliance assessment for January to December 2004. Compliance criteria are applied on an individual basis at each performance monitoring station operating in the various Queensland regions during the year. South-east Queensland performance monitoring stations are further classified under the respective sub-region.

The National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 8 specifies that to make a valid assessment of compliance, a data availability rate of at least 75 percent in each calendar quarter is required. For this reason, compliance with the standards and 2008 goal could not be demonstrated at the Brisbane CBD, Targinie, Stuart and Pimlico monitoring stations. There were no exceedences of standards in the available measurement data from these stations.

Tables 2 to 7 summarise compliance of monitoring with the standards and 2008 goal for AAQ NEPM pollutants for 2004. Performance is assessed as meeting the standards and goals if the number of exceedences of the standard is no more than the number specified in schedule 2 of the AAQ NEPM and data availability was at least 75 percent in each quarter of the year. Regions where monitoring has not been conducted can also be considered to meet the standards and goals on the basis that screening shows pollutant levels are reasonably expected to be consistently below the relevant standard (National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 4, "Screening Procedures" (available from *www.ephc.gov.au*)).

TEOM PM_{10} data quoted in this report have been adjusted using the temperature-dependent factor described in option 2 in the National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 10, "Collection and Reporting of TEOM PM_{10} Data" (available from *www.ephc.gov.au*). The resulting adjustments vary linearly from no change at daily average temperatures at or above 15deg to an increase of 40 percent at a temperature of 5deg.

$PM_{2.5}$ data in this report has been obtained using either reference samplers (Partisol 2025 sequential air samplers) operating on a one in three day basis or TEOM $PM_{2.5}$ instrumentation operating continuously. The TEOM instrumentation has been operated in accordance with the protocol outlined in the National Environment Protection (Ambient Air Quality) Measure Technical Paper on Monitoring for Particles as $PM_{2.5}$.

Carbon monoxide

Table 2: 2004 compliance summary for carbon monoxide in Queensland

AAQ NEPM Standard
9.0 ppm (8-hour average)

Region/ Performance monitoring station	Data availability rates (% of hours)					Number of exceedences (days)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
South-east Queensland							
Brisbane sub-region							
Brisbane CBD	99.9	92.4	99.8	36.2	82.0	0	ND
Woolloongabba	94.2	95.1	91.3	91.9	93.1	0	met
Toowoomba							
North Toowoomba	95.4	95.2	95.5	93.0	94.8	0	met

ND = "not demonstrated" due to insufficient data

Regions which do not require monitoring on the basis of screening arguments that pollutant levels are reasonably expected to be consistently below the relevant NEPM standard (i.e. performance is "met").

- Bundaberg
- Cairns
- Gladstone
- Mackay
- Maryborough/Hervey Bay
- Rockhampton
- Townsville
- Mount Isa

Motor vehicles are the major contributor to ambient carbon monoxide levels in urban areas where the use of combustion stoves and wood heaters in winter is minimal. Peak carbon monoxide concentrations in the south-east Queensland region for the period 2000 to 2004 have been consistently less than 40 percent of the AAQ NEPM standard (see section D). On this basis, carbon monoxide monitoring in coastal Queensland centres with lower traffic density and warmer winter temperatures than south-east Queensland is not required under screening procedure F in table 1 of the National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 4, "Screening Procedures".

Carbon monoxide compliance in Mount Isa can be inferred on the basis of campaign monitoring conducted in Toowoomba, an inland Queensland centre with greater population, lower winter temperatures and higher solid fuel heater use. The maximum 8-hour average carbon monoxide concentration measured in Toowoomba from July 2003 to December 2004 was 3.4ppm, which is less than 40 percent of the AAQ NEPM standard. Using screening procedure F in table 1 of the National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 4, "Screening Procedures", it can be concluded that carbon monoxide levels in Mount Isa will be consistently below the AAQ NEPM standard.

Nitrogen dioxide

Table 3: 2004 compliance summary for nitrogen dioxide in Queensland

AAQ NEPM Standard
0.12 ppm (1-hour average)
0.03 ppm (1-year average)

Region/ Performance monitoring station	Data availability rates (% of hours)					Number of exceedences (days)	Annual mean (ppm)	Performance against the standards and goal	
	Q1	Q2	Q3	Q4	Annual			1-hour	1-year
South-east Queensland									
North Coast sub-region									
Mountain Creek	88.2	95.3	94.6	95.1	93.3	0	0.005	met	met
	92.9	95.2	93.3	93.1	93.6	0	0.006	met	met
Brisbane sub-region	88.1	95.3	94.3	93.8	92.9	0	0.009	met	met
Deception Bay	82.1	97.2	99.7	98.6	94.4	0	0.007	met	met
Rocklea									
Springwood	94.0	94.8	95.0	94.7	94.6	0	0.009	met	met
Ipswich sub-region									
Flinders View	93.9	95.2	93.7	94.7	94.4	0	0.007	met	met
Toowoomba									
North Toowoomba	94.8	95.1	95.2	95.1	95.0	0	0.004	met	met
Gladstone									
South Gladstone	0.0	37.0	94.7	94.8	56.8	0	0.006	ND	ND
Townsville									
Pimlico									

ND = "not demonstrated" due to insufficient data

Regions which may not require monitoring but for which screening has not yet been carried out (i.e. performance is "not demonstrated").

- Bundaberg
- Cairns
- Mackay
- Maryborough/Hervey Bay
- Mount Isa
- Rockhampton

Ozone

Table 4: 2004 compliance summary for ozone in Queensland

AAQ NEPM Standard
0.10 ppm (1-hour average)
0.08 ppm (4-hour average)

Region/ Performance monitoring station	Data availability rates (% of hours)					Number of exceedences (days)		Performance against the standards and goal	
	Q1	Q2	Q3	Q4	Annual	1-hour	4-hour	1-hour	4-hour
South-east Queensland									
North Coast sub-region									
Mountain Creek	95.0	95.4	94.5	95.2	95.0	0	0	met	met
Brisbane sub-region									
Deception Bay	92.8	95.5	93.9	89.1	92.8	0	0	met	met
Rocklea	88.0	95.1	94.6	93.9	92.9	0	0	met	met
Springwood	86.6	99.8	99.9	98.8	96.3	0	0	met	met
Ipswich sub-region									
Flinders View	94.0	94.7	95.2	95.0	94.7	2	1	not met	met
Toowoomba									
North Toowoomba	94.0	95.1	95.4	94.5	94.8	0	0	met	met
Gladstone									
Targinie	62.5	98.6	96.8	86.1	86.0	0	0	ND	ND
Townsville									
Pimlico	0.0	36.4	94.7	94.8	56.7	0	0	ND	ND

ND = "not demonstrated" due to insufficient data

Regions which may not require monitoring but for which screening has not yet been carried out (i.e. performance is "not demonstrated").

- Bundaberg
- Cairns
- Mackay
- Maryborough/Hervey Bay
- Mount Isa
- Rockhampton

Sulfur dioxide

Table 5: 2004 compliance summary for sulfur dioxide in Queensland

AAQ NEPM Standard
0.20 ppm (1-hour average)
0.08 ppm (24-hour average)
0.02 ppm (1-year average)

Region/ Performance monitoring station	Data availability rates (% of hours)					Number of exceedences (days)		Annual mean (ppm)	Performance against the standards and goal		
	Q1	Q2	Q3	Q4	Annual	1h	24h		1h	24h	1y
South-east Queensland											
Brisbane sub-region Springwood	86.6	99.8	99.9	98.8	96.3	0	0	0.001	met	met	met
Ipswich sub-region Flinders View	94.0	94.7	94.7	94.9	94.6	0	0	0.001	met	met	met
Gladstone South Gladstone	94.7	91.3	95.2	88.0	92.3	0	0	0.001	met	met	met
Townsville Stuart	62.0	95.5	95.3	71.6	81.1	0	0	0.000	ND	ND	ND
Mount Isa Menzies	95.7	93.4	95.5	89.5	93.5	36	1	0.007	not met	met	met

ND = "not demonstrated" due to insufficient data

Regions which do not require monitoring on the basis of screening arguments that pollutant levels are reasonably expected to be consistently below the relevant NEPM standard (i.e. performance is "met").

- Bundaberg
- Cairns
- Mackay
- Maryborough/Hervey Bay
- Toowoomba

Unless significant industrial point sources of sulfur dioxide exist in a region (e.g. coal-fired power stations and metals smelting), emissions of sulfur dioxide are low. Peak sulfur dioxide concentrations in the Brisbane sub-region of south-east Queensland are less than 40 percent of the AAQ NEPM standard (see section D). On this basis, sulfur dioxide monitoring in other Queensland centres with lower population and no significant sulfur dioxide point sources is not required under screening procedure F in table 1 of National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 4, "Screening Procedures".

Regions for which monitoring has not yet been carried out (i.e. performance is "not demonstrated").

- Rockhampton

Particles as PM_{10}

Table 6: 2004 compliance summary for PM_{10} in Queensland

AAQ NEPM Standard
50 µg/m³ (24-hour average)

Region/ Performance monitoring station	Data availability rates (% of days)					Number of exceedences (days)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
South-east Queensland							
North Coast sub-region							
Mountain Creek	93.4	100.0	98.9	94.6	96.7	1	met
Brisbane sub-region							
Rocklea	87.9	100.0	97.8	84.8	92.6	2	met
Springwood	90.1	100.0	100.0	98.9	97.3	0	met
Ipswich sub-region							
Flinders View	96.7	100.0	100.0	100.0	99.2	3	met
Toowoomba							
North Toowoomba	97.8	100.0	97.8	100.0	98.9	1	met
Gladstone							
South Gladstone	98.9	100.0	100.0	100.0	99.7	0	met
Mackay							
West Mackay	94.5	96.7	98.9	98.9	97.3	0	met
Townsville							
Pimlico	0.0	37.4	71.7	98.9	52.2	0	ND

ND = "not demonstrated" due to insufficient data

Regions for which monitoring has not yet been carried out (i.e. performance is "not demonstrated").

- Bundaberg
- Cairns
- Maryborough/Hervey Bay
- Mount Isa
- Rockhampton

Particles as $PM_{2.5}$

Table 7: 2004 compliance summary for $PM_{2.5}$ in Queensland

AAQ NEPM Advisory Standard
25 µg/m³ (24-hour average)
8 µg/m³ (1-year average)

Region/ Performance monitoring station	Data availability rates (% of days)					Number of exceedences (days)	Annual mean (µg/m³)
	Q1	Q2	Q3	Q4	Annual		
South-east Queensland							
Brisbane sub-region							
Rocklea[a]	0.0	0.0	23.9	27.2	12.9	0	6.8
Rocklea[b]	90.1	100.0	97.8	90.2	94.5	5	6.1
Springwood[a]	0.0	0.0	20.7	25.0	11.5	0	6.7
Springwood[b]	95.6	100.0	98.9	100.0	98.6	0	5.3
Toowoomba							
North Toowoomba[b]	97.8	100.0	96.7	100.0	98.6	1	5.1

[a]Monitoring by reference method (1 in 3 days)

[b]Monitoring by TEOM instrumentation in accordance with Technical Paper on Monitoring for Particles as $PM_{2.5}$

Regions for which monitoring has not yet been carried out (i.e. performance is "not demonstrated").

- Bundaberg
- Cairns
- Gladstone
- Mackay
- Maryborough/Hervey Bay
- Mount Isa
- Rockhampton
- Townsville

Lead

No lead monitoring was conducted in Queensland in 2004. In the absence of non-vehicle sources of lead (e.g. metals smelting), no significant sources of lead now exist in most Queensland regions following the phase-out of leaded motor vehicle fuel from March 2001. Annual lead concentrations measured at the south-east Queensland performance monitoring station (Woolloongabba) were less than 10 percent of the AAQ NEPM standard for both 2001 (0.03 µg/m^3) and 2002 (0.02 µg/m^3). As outlined in the National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 9, "Lead Monitoring" (available from *www.ephc.gov.au*), these measurements demonstrate that compliance with the AAQ NEPM standard and 2008 goal has been achieved in south-east Queensland, and monitoring of lead ceased from the end of 2002.

Regions which do not require monitoring on the basis of screening arguments that pollutant levels are reasonably expected to be consistently below the relevant NEPM standard (i.e performance is "met").

- Bundaberg
- Cairns
- Gladstone
- Mackay
- Maryborough/Hervey Bay
- Rockhampton
- South-east Queensland
- Toowoomba
- Townsville

Peak lead concentrations in south-east Queensland have been less than 40 percent of the AAQ NEPM standard since 1999 (see section D, table 46). On this basis, lead monitoring in other Queensland centres with lower population and traffic density (with the exception of Mount Isa where additional lead emission sources exist) is not required under screening procedure F in table 1 of the National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 4, "Screening Procedures".

Regions for which monitoring has not yet been carried out (i.e. performance is "not demonstrated").

- Mount Isa

Section C – Assessment of monitoring data against the standards

Information provided in this section allows qualitative and quantitative assessment and comparison of monitoring data against the standards for 2004. Statistics provided include the listing of exceedences and circumstances which led to these exceedences, and annual maxima, the second highest (for carbon monoxide, nitrogen dioxide, ozone and sulfur dioxide) and sixth highest (for PM_{10}) daily concentrations, together with the date and site of each occurrence. Exceedence details are provided in tables 8 to 11. Summary maxima statistics are provided in tables 12 to 19.

Details of $PM_{2.5}$ measurements obtained using both reference samplers and TEOM instrumentation are also provided. The TEOM instruments were operated in accordance with the method outlined in the AAQ NEPM "Technical Paper on Monitoring for Particles as $PM_{2.5}$". However TEOM $PM_{2.5}$ data cannot be used for comparison with the AAQ NEPM advisory reporting standards until the outcomes of the $PM_{2.5}$ equivalence program have been formally included in the principal measure.

Exceedence summary

During 2004, exceedences of AAQ NEPM standards occurred for ozone, sulfur dioxide and PM_{10}. There were no exceedences of the AAQ NEPM standards for carbon monoxide and nitrogen dioxide. Lead monitoring was not conducted in 2004, as compliance with the standard and 2008 goal was demonstrated in 2002 for all regions with the exception of Mount Isa where monitoring is yet to commence. TEOM 24-hour $PM_{2.5}$ concentrations were above the AAQ NEPM advisory reporting standard on six occasions.

Additional information on the circumstances which led to exceedences of standards during 2004 are provided in an appendix.

Table 8: 2004 ozone exceedences in Queensland

AAQ NEPM standard
0.10 ppm (1-hour average)
0.08 ppm (4-hour average)

Region/ Performance monitoring station	Standard	Concentration (ppm)	Date	Time	Circumstances
South-east Queensland					
Flinders View	1-hour	0.114	Oct24	14	Bushfire emissions
		0.101	Oct13	14	Bushfire emissions
	4-hour	0.100	Oct24	14	Bushfire emissions

Table 9: 2004 sulfur dioxide exceedences in Queensland

AAQ NEPM standard
0.20 ppm (1-hour average)
0.08 ppm (24-hour average)
0.02 ppm (1-year average)

Region/ Performance monitoring station	Standard	Concentration (ppm)	Date	Time	Circumstances
Mount Isa					
Menzies	1-hour	0.888	Jan28	14	Industry emissions
		0.705	Mar09	14	Industry emissions
		0.665	Aug26	17	Industry emissions
			Sep24	16	Industry emissions
		0.490	Jan03	15	Industry emissions
		0.489	Oct21	17	Industry emissions
		0.444	Dec01	14	Industry emissions
		0.441	Feb02	12	Industry emissions
		0.435	Nov03	10	Industry emissions
		0.419	Aug15	15	Industry emissions
		0.413	Dec06	16	Industry emissions
		0.405	Nov04	12	Industry emissions
		0.348	Jan16	10	Industry emissions
		0.344	Jul03	16	Industry emissions
		0.333	Oct18	17	Industry emissions
		0.328	Aug22	16	Industry emissions
		0.309	Oct06	17	Industry emissions
		0.302	Oct26	20	Industry emissions
		0.287	Dec14	13	Industry emissions
		0.269	Sep25	19	Industry emissions
		0.268	Jan08	14	Industry emissions
		0.262	Jul26	16	Industry emissions
		0.255	Oct24	10	Industry emissions
		0.249	Sep08	16	Industry emissions
		0.248	Dec05	17	Industry emissions
		0.245	Dec04	15	Industry emissions
		0.243	Jan04	13	Industry emissions
		0.240	May14	18	Industry emissions
		0.239	Sep05	17	Industry emissions
		0.233	Mar06	11	Industry emissions
		0.227	Nov13	15	Industry emissions
		0.219	Jul31	16	Industry emissions
		0.211	Aug17	18	Industry emissions

			Nov09	18	Industry emissions
		0.208	Oct05	16	Industry emissions
		0.207	Sep26	15	Industry emissions
	24-hour	0.100	Jan28	24	Industry emissions

Table 10: 2004 PM_{10} exceedences in Queensland

AAQ NEPM standard
50 µg/m³ (24-hour average)

Region/ Performance monitoring station	Concentration (µg/m³)	Date	Time	Circumstances
South-east Queensland Mountain Creek	66.6	Oct01	24	Car park construction works at a nearby TAFE complex
South-east Queensland Rocklea	52.4 51.1	Jul01 Jun29	24 24	Smoke from a hazard-reduction burn Smoke from a fire at nearby industrial premises
South-east Queensland Flinders View	64.1 63.1 51.5	Oct23 Oct24 Oct09	24 24 24	Bushfire smoke Bushfire smoke Bushfire smoke
Toowoomba North Toowoomba	54.5	Jul01	24	Solid fuel heater emissions (smoke from hazard-reduction burns may have also contributed)

Table 11: 2004 $PM_{2.5}$ exceedences in Queensland

AAQ NEPM advisory reporting standard
25 µg/m³ (24-hour average)
8 µg/m³ (1-year average)

Region/ Performance monitoring station	Concentration (µg/m³)	Date	Time	Circumstances
South-east Queensland Rocklea[a]	29.7 28.8 28.7 25.7 25.6	Oct24 Oct23 Oct09 Oct08 Oct15	24 24 24 24 24	Bushfire smoke Bushfire smoke Bushfire smoke Bushfire smoke Bushfire smoke
Toowoomba North Toowoomba[a]	33.2	Oct25	24	Smoke from a local fire (smoke from bushfires may have also contributed)

[a]Monitoring by TEOM instrumentation in accordance with Technical Paper on Monitoring for Particles as $PM_{2.5}$

2004 maximum, second-highest and sixth-highest concentration summaries

Table 12: 2004 summary statistics for daily peak 8-hour CO in Queensland

AAQ NEPM standard
9.0 ppm (8-hour average)

Region/ Performance monitoring station	Number of valid days	Highest (ppm)	Highest (date:hour)	2nd highest (ppm)	2nd highest (date:time)

South-east Queensland Brisbane CBD Woolloongabba	299 362	3.3 4.7	Aug02:01 Jul02:01	3.1 4.3	Jun30:02 Jul17:01
Toowoomba North Toowoomba	355	3.4	Jun26:02	3.2	Ju211:01

Table 13: 2004 summary statistics for daily peak 1-hour nitrogen dioxide in Queensland

AAQ NEPM standard
0.12 ppm (1-hour average)

Region/ Performance monitoring station	Number of valid days	Highest (ppm)	Highest (date:hour)	2nd highest (ppm)	2nd highest (date:time)
South-east Queensland	359	0.041	Sep10:20	0.039	Aug23:19
Mountain Creek	358	0.045	Jul01:20	0.041	Sep16:20 May18:19
Deception Bay	350	0.049	May14:19		May21:19
Rocklea	342	0.038	May18:19 Nov09:18		
Springwood	366	0.054	Nov12:20 May18:18	0.047	Apr01:19
Flinders View					Jun30:19 Jul02:18
Toowoomba North Toowoomba	360	0.054	May18:09	0.053	Oct14:20
Gladstone South Gladstone	366	0.042	Oct16:11	0.032	Aug08:20 Aug19:19
Townsville Pimlico	216	0.034	Aug11:20	0.032	Aug12:21 Aug21:21

Table 14: 2004 summary statistics for daily peak 1-hour ozone in Queensland

AAQ NEPM standard
0.10 ppm (1-hour average)

Region/ Performance monitoring station	Number of valid days	Highest (ppm)	Highest (date:hour)	2nd highest (ppm)	2nd highest (date:time)
South-east Queensland	366	0.060	Oct08:16	0.052	Oct24:24
Mountain Creek	354	0.070	Feb16:15	0.064	Oct23:12
Deception Bay	351	0.088	Jan28:14	0.086	Nov30:13
Rocklea	350	0.060	Mar09:14	0.058	Jan28:14
Springwood	366	0.114	Oct24:14	0.101	Oct13:14
Flinders View					
Toowoomba North Toowoomba	363	0.084	Feb23:18	0.070	Oct25:16
Gladstone Targinie	310	0.040	Nov29:14	0.035	Jan18:15
Townsville Pimlico	215	0.047	Sep02:14 Oct20:14		

Table 15: 2004 summary statistics for daily peak 4-hour ozone in Queensland

AAQ NEPM standard
0.08 ppm (4-hour average)

Region/ Performance monitoring station	Number of valid days	Highest (ppm)	Highest (date:hour)	2nd highest (ppm)	2nd highest (date:time)
South-east Queensland	366	0.047	Aug23:17 Oct06:17 Oct08:19		
Mountain Creek	354	0.062	Oct23:15	0.056	Feb16:15 Apr13:17
Deception Bay	351	0.077	Feb20:15	0.073	Jan28:16
Rocklea	350	0.052	Jan28:16	0.052	Mar09:16
Springwood	366	0.100	Oct24:14	0.077	Oct13:15
Flinders View					
Toowoomba	363	0.070	Feb23:19	0.061	Oct25:18
North Toowoomba					
Gladstone	310	0.030	Sep12:19 Nov29:15		
Targinie					
Townsville	215	0.045	Sep02:16 Oct20:15		
Pimlico					

Table 16: 2004 summary statistics for daily peak 1-hour sulfur dioxide in Queensland

AAQ NEPM standard
0.20 ppm (1-hour average)

Region/ Performance monitoring station	Number of valid days	Highest (ppm)	Highest (date:hour)	2nd highest (ppm)	2nd highest (date:time)
South-east Queensland	349	0.017	Apr13:10	0.015	May19:13 May21:12
Springwood	364	0.063	Apr21:11	0.045	Apr13:11
Flinders View					
Gladstone	353	0.064	Oct06:09	0.063	Feb16:10
South Gladstone					
Townsville	311	0.006	May29:19	0.005	Apr07:22
Stuart					
Mount Isa	357	0.888	Jan28:14	0.705	Mar09:14
Menzies					

Table 17: 2004 summary statistics for 24-hour sulfur dioxide in Queensland

AAQ NEPM standard
0.08 ppm (24-hour average)

Region/ Performance monitoring station	Number of valid days	Highest (ppm)	Highest (date)	2nd highest (ppm)	2nd highest (date)
South-east Queensland					
Springwood	349	0.004	Jan07	0.003	Jan08 May19 Jul26 Oct22 Oct23 Dec11
Flinders View	364	0.007	Apr21	0.006	Feb14 Mar15 Apr05 May07
Gladstone					
South Gladstone	353	0.007	Jan02 Mar03		
Townsville					
Stuart	311	0.002	Sep14	0.001	94 days in total
Mount Isa					
Menzies	357	0.100	Jan28	0.079	Jan16

Table 18: 2004 summary statistics for 24-hour PM_{10} in Queensland

AAQ NEPM standard
50 µg/m³ (24-hour average)

Region/ Performance monitoring station	Number of valid days	Highest (µg/m³)	Highest (date)	6th highest (µg/m³)	6th highest (date)
South-east Queensland					
Mountain Creek	354	66.6	Oct01	35.0	Oct15
Rocklea	339	52.4	Jul01	40.3	Jun22
Springwood	356	40.3	Oct23	34.7	Feb22
Flinders View	363	64.1	Oct23	38.7	Dec02
Toowoomba					
North Toowoomba	362	54.5	Jul01	43.6	Aug12
Gladstone					
South Gladstone	365	42.7	Sep09	32.6	Nov14
Mackay					
West Mackay	356	45.3	Aug17	37.9	Aug10
Townsville					
Pimlico	191	28.1	Oct19	25.1	Oct14

Table 19: 2004 summary statistics for 24-hour $PM_{2.5}$ in Queensland

AAQ NEPM advisory reporting standard
25 µg/m³ (24-hour average)
8 µg/m³ (1-year average)

Region/ Performance monitoring station	Number of valid days	Highest (µg/m³)	Highest (date)
South-east Queensland			
Rocklea[a]	47	21.6	Oct24
Rocklea[b]	346	29.7	Oct24
Springwood[a]	42	17.2	Oct24
Springwood[b]	361	21.7	Oct23
Toowoomba			
North Toowoomba[b]	361	33.2	Oct25

[a]Monitoring by reference method (1 in 3 days)

[b]Monitoring by TEOM instrumentation in accordance with Technical Paper on Monitoring for Particles as $PM_{2.5}$

Section D – Data analysis

This section provides pollutant distribution information for 2004 (tables 20 to 27), and multi-year data for nominated trend stations in the Queensland air monitoring plan (tables 28 to 51).

2004 pollutant distribution information

Table 20: Percentiles of daily peak 8-hour carbon monoxide concentrations for 2004

AAQ NEPM standard
9.0 ppm (8-hour average)

	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
South-east Queensland								
Brisbane CBD	81.7	3.3	3.1	2.3	1.7	1.2	0.7	0.3
Woolloongabba	98.9	4.7	4.2	3.8	3.3	2.6	1.6	1.1
Toowoomba								
North Toowoomba	97.0	3.4	2.8	2.5	2.0	1.5	0.6	0.3

Table 21: Percentiles of daily peak 1-hour nitrogen dioxide concentrations for 2004

AAQ NEPM standard
0.12 ppm (1-hour average)

	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
South-east Queensland								
Mountain Creek	98.1	0.041	0.036	0.035	0.029	0.026	0.020	0.011
Deception Bay	97.8	0.045	0.036	0.036	0.030	0.027	0.023	0.015

Rocklea Springwood Flinders View	95.6 93.4 100.0	0.049 0.038 0.054	0.047 0.037 0.047	0.043 0.035 0.038	0.037 0.032 0.034	0.033 0.030 0.030	0.026 0.025 0.025	0.018 0.018 0.020
Toowoomba North Toowoomba	98.4	0.054	0.041	0.039	0.035	0.031	0.025	0.016
Gladstone South Gladstone	100.0	0.042	0.030	0.029	0.026	0.023	0.018	0.012
Townsville Pimlico	59.0	0.034	0.032	0.031	0.030	0.027	0.023	0.017

Table 22: Percentiles of daily peak 1-hour ozone concentrations for 2004

AAQ NEPM standard
0.10 ppm (1-hour average)

	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
South-east Queensland								
Mountain Creek	100.0	0.060	0.050	0.045	0.041	0.037	0.031	0.028
Deception Bay	96.7	0.070	0.058	0.055	0.048	0.045	0.039	0.034
Rocklea	95.9	0.088	0.080	0.076	0.064	0.055	0.043	0.035
Springwood	95.6	0.060	0.050	0.046	0.040	0.036	0.029	0.023
Flinders View	100.0	0.114	0.079	0.077	0.066	0.058	0.044	0.034
Toowoomba								
North Toowoomba	99.2	0.084	0.064	0.058	0.052	0.048	0.040	0.034
Gladstone								
Targinie	84.7	0.040	0.034	0.032	0.030	0.027	0.024	0.020
Townsville								
Pimlico	58.7	0.047	0.047	0.045	0.041	0.039	0.034	0.031

Table 23: Percentiles of daily peak 4-hour ozone concentrations for 2004

AAQ NEPM standard
0.08 ppm (4-hour average)

	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
South-east Queensland								
Mountain Creek	100.0	0.047	0.044	0.042	0.038	0.035	0.031	0.026
Deception Bay	96.7	0.062	0.053	0.049	0.044	0.042	0.037	0.033
Rocklea	95.9	0.077	0.069	0.064	0.057	0.050	0.040	0.033
Springwood	95.6	0.052	0.045	0.042	0.034	0.032	0.026	0.022
Flinders View	100.0	0.100	0.071	0.067	0.057	0.050	0.040	0.032
Toowoomba								
North Toowoomba	99.2	0.070	0.058	0.053	0.048	0.044	0.037	0.032
Gladstone								
Targinie	84.7	0.030	0.028	0.027	0.026	0.024	0.021	0.018
Townsville								
Pimlico	58.7	0.045	0.045	0.042	0.040	0.037	0.033	0.030

Table 24: Percentiles of daily peak 1-hour sulfur dioxide concentrations for 2004

AAQ NEPM standard
0.20 ppm (1-hour average)

	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
South-east Queensland								
Springwood	95.4	0.017	0.012	0.011	0.009	0.007	0.004	0.002
Flinders View	99.5	0.063	0.036	0.031	0.021	0.016	0.009	0.003
Gladstone								
South Gladstone	96.4	0.064	0.040	0.032	0.022	0.017	0.010	0.005
Townsville								
Stuart	85.0	0.006	0.004	0.004	0.002	0.002	0.001	0.001
Mount Isa								
Menzies	97.5	0.888	0.665	0.444	0.302	0.207	0.033	0.003

Table 25: Percentiles of daily 24-hour sulfur dioxide concentrations for 2004

AAQ NEPM standard
0.08 ppm (24-hour average)

	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
South-east Queensland								
Springwood	95.4	0.004	0.003	0.003	0.002	0.002	0.001	0.001
Flinders View	99.5	0.007	0.006	0.005	0.003	0.003	0.002	0.001
Gladstone								
South Gladstone	96.4	0.007	0.006	0.006	0.004	0.003	0.002	0.001
Townsville								
Stuart	85.0	0.002	0.001	0.001	0.001	0.001	0.001	0.000
Mount Isa								
Menzies	97.5	0.100	0.069	0.050	0.034	0.017	0.004	0.001

Table 26: Percentiles of daily 24-hour PM_{10} concentrations for 2004

AAQ NEPM standard
50 µg/m³ (24-hour average)

	Data availability rates (%)	Max conc. (µg/m³)	99th percentile (µg/m³)	98th percentile (µg/m³)	95th percentile (µg/m³)	90th percentile (µg/m³)	75th percentile (µg/m³)	50th percentile (µg/m³)
South-east Queensland								
Mountain Creek	96.7	66.6	39.2	34.6	29.1	23.3	17.7	13.8
Rocklea	92.6	52.4	44.5	39.9	33.5	28.8	22.9	17.9
Springwood	97.3	40.3	36.3	33.9	28.6	24.9	19.1	16.1
Flinders View	99.2	64.1	40.8	38.5	32.9	28.9	21.6	17.5
Toowoomba								
North Toowoomba	98.9	54.5	47.8	42.1	35.4	29.7	22.3	15.9
Gladstone								
South Gladstone	99.7	42.7	35.6	30.0	25.6	22.4	19.3	15.5
Mackay								
West Mackay	97.3	45.3	39.6	37.7	33.6	29.6	24.5	19.8
Townsville								
Pimlico	52.2	28.1	27.0	25.9	23.2	21.4	18.1	15.7

Table 27: Percentiles of daily 24-hour $PM_{2.5}$ concentrations for 2004

AAQ NEPM advisory reporting standards
25 µg/m³ (24-hour average)
8 µg/m³ (1-year average)

	Data availability rates (%)	Max conc. (µg/m³)	99th percentile (µg/m³)	98th percentile (µg/m³)	95th percentile (µg/m³)	90th percentile (µg/m³)	75th percentile (µg/m³)	50th percentile (µg/m³)
South-east Queensland								
Rocklea[a]	12.9	21.6	21.6	15.3	14.6	11.7	8.6	5.8
Rocklea[b]	94.5	29.7	28.7	22.5	17.2	11.6	7.8	4.9
Springwood[a]	11.5	17.2	17.2	16.1	16.0	12.0	6.9	5.4
Springwood[b]	98.6	21.7	16.8	15.4	11.6	9.5	6.7	4.7
Toowoomba								
North Toowoomba[b]	98.6	33.2	19.1	17.3	14.6	11.7	6.8	4.0

[a]Monitoring by reference method (1 in 3 days)

[b]Monitoring by TEOM instrumentation in accordance with Technical Paper on Monitoring for Particles as $PM_{2.5}$

Multi-year statistics for trend stations

Table 28: Daily peak 8-hour carbon monoxide summary 1998 to 2004

Trend station/region: Brisbane CBD, south-east Queensland

AAQ NEPM standard 9.0 ppm (8-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1998	*73.7**	*0*	*3.4*	3.3	*2.7*	2.6	2.3
1999	80.0*	0	5.8	3.6	3.5	2.9	2.7
2000	78.1*	0	2.7	2.6	2.4	2.2	1.8
2001	95.9	0	3.3	2.4	2.2	1.9	1.6
2002	*72.9**	*0*	*2.5*	*2.3*	*2.1*	*1.6*	*1.5*
2003	97.0	0	2.7	2.2	1.9	1.5	1.2
2004	81.7*	0	3.3	3.1	2.3	1.7	1.2

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 29: Daily peak 8-hour carbon monoxide summary 1998 to 2004

Trend station/region: Woolloongabba, south-east Queensland

AAQ NEPM standard 9.0 ppm (8-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1998	*57.0**	*0*	*5.1*	*5.0*	*4.4*	*4.1*	*3.4*
1999	92.3*	0	5.7	5.3	4.9	4.0	3.2
2000	92.9	0	5.0	4.7	4.2	3.4	2.9
2001	97.0	0	7.0	4.4	4.3	3.9	3.2
2002	97.0	0	4.7	4.7	4.1	3.6	3.0
2003	83.3*	0	5.4	4.4	4.2	3.5	2.7
2004	98.9	0	4.7	4.2	3.8	3.3	2.6

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 30: Daily peak 1-hour nitrogen dioxide summary 1995 to 2004

Trend station/region: Deception Bay, south-east Queensland

AAQ NEPM standard 0.12 ppm (1-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1995	93.4	0	0.058	0.054	0.046	0.038	0.033
1996	*68.6**	*0*	*0.048*	*0.043*	*0.042*	*0.034*	*0.030*
1997	95.6	0	0.043	0.038	0.036	0.032	0.028
1998	97.5	0	0.066	0.050	0.039	0.031	0.026
1999	96.4	0	0.058	0.039	0.030	0.028	0.024
2000	99.5	0	0.053	0.038	0.034	0.029	0.025
2001	95.1	0	0.047	0.040	0.039	0.034	0.030
2002	87.4*	0	0.065	0.044	0.042	0.036	0.030
2003	94.5	0	0.053	0.036	0.033	0.030	0.028

2004	97.8	0	0.045	0.036	0.036	0.030	0.027

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 31: Daily peak 1-hour nitrogen dioxide summary 1980 to 2004

Trend station/region: Rocklea, south-east Queensland

AAQ NEPM standard 0.12 ppm (1-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1980	97.3	0	0.070	0.065	0.058	0.043	0.038
1981	78.9*	0	0.070	0.060	0.051	0.041	0.037
1982	97.8	0	0.073	0.058	0.054	0.048	0.040
1983	95.6	0	0.056	0.050	0.042	0.033	0.030
1984	83.3*	0	0.076	0.061	0.056	0.048	0.041
1985	91.2	0	0.048	0.044	0.039	0.035	0.031
1986	83.6*	2	0.160	0.099	0.069	0.056	0.045
1987	92.1	0	0.089	0.078	0.067	0.060	0.052
1988	*60.1**	*0*	*0.114*	*0.083*	*0.077*	*0.066*	*0.055*
1989	84.4*	0	0.073	0.069	0.061	0.054	0.047
1990	75.3*	0	0.079	0.070	0.064	0.053	0.046
1991	89.0	0	0.113	0.085	0.071	0.061	0.052
1992	77.9*	2	0.157	0.072	0.065	0.052	0.042
1993	89.6	0	0.086	0.066	0.058	0.047	0.040
1994	91.8	0	0.096	0.062	0.057	0.051	0.045
1995	79.5*	0	0.066	0.050	0.048	0.040	0.036
1996	90.4*	0	0.058	0.055	0.044	0.040	0.036
1997	95.6	0	0.061	0.043	0.042	0.039	0.033
1998	96.2	0	0.056	0.046	0.041	0.038	0.033
1999	91.2*	0	0.054	0.044	0.042	0.034	0.029
2000	96.7	0	0.059	0.046	0.043	0.037	0.032
2001	98.4	0	0.049	0.042	0.041	0.035	0.032
2002	98.4	0	0.051	0.046	0.041	0.037	0.033
2003	97.0	0	0.050	0.039	0.038	0.033	0.030
2004	95.6	0	0.049	0.047	0.043	0.037	0.033

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 32: Daily peak 1-hour nitrogen dioxide summary 1995 to 2004

Trend station/region: Flinders View, south-east Queensland

AAQ NEPM standard 0.12 ppm (1-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1995	91.2*	0	0.038	0.037	0.035	0.031	0.028
1996	98.4	0	0.055	0.050	0.044	0.037	0.033
1997	96.4	0	0.046	0.042	0.040	0.036	0.030
1998	96.4	0	0.048	0.041	0.039	0.034	0.030
1999	98.4	0	0.046	0.039	0.038	0.032	0.029
2000	99.2	0	0.042	0.040	0.038	0.034	0.031
2001	100.0	0	0.045	0.037	0.036	0.034	0.031
2002	88.8*	0	0.062	0.057	0.043	0.036	0.033

2003	94.0	0	0.046	0.039	0.037	0.033	0.029
2004	100.0	0	0.054	0.047	0.038	0.034	0.030

*Data availability less than 75 percent for one or more quarters.

Table 33: Daily peak 1-hour nitrogen dioxide summary 1994 to 2004

Trend station/region: South Gladstone, Gladstone

AAQ NEPM standard 0.12 ppm (1-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1994	81.6*	0	0.049	0.047	0.044	0.038	0.028
1995	91.8	0	0.038	0.030	0.028	0.025	0.022
1996	84.2*	0	0.045	0.039	0.035	0.032	0.029
1997	*65.8**	*0*	*0.031*	*0.030*	*0.029*	*0.022*	*0.017*
1998	*72.9**	*0*	*0.022*	*0.020*	*0.018*	*0.015*	*0.012*
1999	88.8*	0	0.034	0.029	0.029	0.025	0.021
2000	97.8	0	0.031	0.025	0.024	0.022	0.019
2001	96.4	0	0.048	0.033	0.031	0.026	0.023
2002	98.4	0	0.036	0.031	0.029	0.026	0.021
2003	95.3	0	0.035	0.030	0.027	0.024	0.022
2004	100.0	0	0.042	0.030	0.029	0.026	0.023

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 34: Daily peak 1-hour ozone summary 1995 to 2004

Trend station/region: Deception Bay, south-east Queensland

AAQ NEPM standard 0.10 ppm (1-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1995	95.9	0	0.083	0.075	0.070	0.052	0.047
1996	95.9	0	0.091	0.073	0.064	0.055	0.048
1997	100.0	0	0.079	0.065	0.057	0.048	0.043
1998	94.2	0	0.069	0.060	0.053	0.048	0.044
1999	99.2	0	0.092	0.062	0.057	0.048	0.043
2000	99.7	0	0.070	0.058	0.054	0.046	0.041
2001	86.6*	0	0.079	0.058	0.054	0.048	0.044
2002	89.6*	0	0.071	0.063	0.061	0.048	0.044
2003	97.0	0	0.095	0.063	0.057	0.047	0.043
2004	96.7	0	0.070	0.058	0.055	0.048	0.045

*Data availability less than 75 percent for one or more quarters.

Table 35: Daily peak 1-hour ozone summary 1980 to 2004

Trend station/region: Rocklea, south-east Queensland

AAQ NEPM standard 0.10 ppm (1-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1980	97.5	0	0.083	0.078	0.066	0.058	0.050
1981	90.7	0	0.078	0.073	0.062	0.049	0.042
1982	97.8	1	0.102	0.070	0.065	0.057	0.047
1983	97.5	0	0.099	0.071	0.068	0.059	0.041
1984	95.1	1	0.102	0.070	0.064	0.055	0.046
1985	91.0	1	0.105	0.079	0.056	0.047	0.036
1986	84.1*	0	0.074	0.073	0.063	0.057	0.050
1987	*72.1**	*4*	*0.125*	*0.106*	*0.100*	*0.078*	*0.055*
1988	*67.5**	*1*	*0.101*	*0.085*	*0.069*	*0.047*	*0.039*
1989	82.5*	0	0.071	0.058	0.051	0.042	0.036
1990	76.2*	0	0.061	0.051	0.042	0.036	0.031
1991	91.2	0	0.061	0.053	0.045	0.039	0.031
1992	94.0	0	0.069	0.059	0.049	0.039	0.035
1993	94.8	0	0.096	0.063	0.059	0.054	0.050
1994	95.1	1	0.127	0.083	0.073	0.059	0.050
1995	78.6*	0	0.098	0.086	0.070	0.061	0.053
1996	97.0	2	0.135	0.090	0.085	0.071	0.060
1997	97.0	0	0.093	0.085	0.077	0.065	0.053
1998	95.1	1	0.103	0.080	0.078	0.064	0.053
1999	94.2	1	0.135	0.093	0.066	0.057	0.047
2000	96.2	0	0.088	0.076	0.066	0.057	0.049
2001	99.2	0	0.093	0.072	0.063	0.055	0.047
2002	98.6	2	0.118	0.075	0.073	0.060	0.054
2003	97.8	0	0.065	0.063	0.059	0.052	0.046
2004	95.9	0	0.088	0.080	0.076	0.064	0.055

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 36: Daily peak 1-hour ozone summary 1994 to 2004

Trend station/region: Flinders View, south-east Queensland

AAQ NEPM standard 0.10 ppm (1-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1994	97.5	0	0.076	0.069	0.062	0.056	0.048
1995	95.1	0	0.079	0.071	0.065	0.056	0.051
1996	98.6	2	0.125	0.082	0.075	0.063	0.055
1997	97.5	2	0.106	0.094	0.078	0.066	0.056
1998	95.1	0	0.100	0.085	0.076	0.066	0.056
1999	98.6	1	0.127	0.082	0.077	0.055	0.048
2000	99.2	1	0.116	0.073	0.070	0.060	0.054
2001	99.5	0	0.079	0.074	0.070	0.059	0.051

2002	95.3	0	0.098	0.080	0.078	0.070	0.062
2003	96.7	0	0.087	0.073	0.068	0.056	0.048
2004	100.0	2	0.114	0.079	0.077	0.066	0.058

Table 37: Daily peak 4-hour ozone summary 1995 to 2004

Trend station/region: Deception Bay, south-east Queensland

AAQ NEPM standard 0.08 ppm (4-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1995	95.9	0	0.077	0.061	0.057	0.047	0.043
1996	95.9	0	0.076	0.065	0.059	0.049	0.045
1997	100.0	0	0.066	0.053	0.050	0.044	0.040
1998	94.2	0	0.059	0.054	0.049	0.043	0.040
1999	99.2	1	0.083	0.055	0.052	0.043	0.039
2000	99.7	0	0.063	0.050	0.049	0.042	0.038
2001	86.6*	0	0.075	0.056	0.050	0.044	0.040
2002	89.6*	0	0.067	0.060	0.053	0.044	0.041
2003	97.0	0	0.076	0.060	0.052	0.044	0.040
2004	96.7	0	0.062	0.053	0.049	0.044	0.042

*Data availability less than 75 percent for one or more quarters.

Table 38: Daily peak 4-hour ozone summary 1994 to 2004

Trend station/region: Flinders View, south-east Queensland

AAQ NEPM standard 0.08 ppm (4-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1994	97.5	0	0.072	0.058	0.056	0.047	0.043
1995	95.1	0	0.066	0.062	0.060	0.050	0.044
1996	98.6	2	0.091	0.068	0.065	0.058	0.049
1997	97.5	2	0.090	0.073	0.067	0.056	0.049
1998	95.1	0	0.069	0.065	0.064	0.057	0.049
1999	98.6	1	0.101	0.067	0.064	0.049	0.043
2000	99.2	1	0.089	0.064	0.061	0.052	0.048
2001	99.5	0	0.072	0.066	0.058	0.052	0.047
2002	95.3	1	0.083	0.070	0.066	0.061	0.055
2003	96.7	0	0.080	0.067	0.059	0.049	0.044
2004	100.0	1	0.100	0.071	0.067	0.057	0.050

Table 39: Daily peak 4-hour ozone summary 1980 to 2004

Trend station/region: Rocklea, south-east Queensland

AAQ NEPM standard 0.08 ppm (4-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1980	97.5	0	0.076	0.063	0.059	0.049	0.043
1981	90.7	0	0.069	0.056	0.051	0.043	0.038
1982	97.8	0	0.076	0.058	0.053	0.048	0.040
1983	97.5	0	0.078	0.058	0.054	0.047	0.036
1984	95.1	0	0.080	0.059	0.054	0.047	0.041
1985	91.0	1	0.090	0.069	0.051	0.039	0.031
1986	84.1*	0	0.063	0.059	0.052	0.049	0.041
1987	*72.1**	*8*	*0.110*	*0.094*	*0.093*	*0.066*	*0.049*
1988	*67.5**	*1*	*0.081*	*0.065*	*0.050*	*0.041*	*0.035*
1989	82.5*	0	0.060	0.048	0.042	0.037	0.032
1990	76.2*	0	0.053	0.042	0.037	0.030	0.028
1991	91.2	0	0.054	0.043	0.039	0.032	0.026
1992	94.0	0	0.058	0.052	0.042	0.034	0.031
1993	94.8	0	0.074	0.054	0.053	0.048	0.043
1994	95.1	1	0.101	0.075	0.063	0.051	0.043
1995	78.6*	0	0.080	0.070	0.058	0.054	0.047
1996	97.0	1	0.111	0.076	0.070	0.061	0.051
1997	97.0	0	0.080	0.069	0.064	0.056	0.045
1998	95.1	1	0.091	0.068	0.064	0.057	0.049
1999	94.2	1	0.102	0.066	0.058	0.049	0.042
2000	96.2	0	0.072	0.063	0.054	0.049	0.044
2001	99.2	0	0.071	0.063	0.056	0.048	0.043
2002	98.6	1	0.105	0.068	0.061	0.054	0.047
2003	97.8	0	0.059	0.053	0.051	0.047	0.042
2004	95.9	0	0.077	0.069	0.064	0.057	0.050

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 40: Daily peak 1-hour sulfur dioxide summary 1993 to 2004

Trend station/region: Flinders View, south-east Queensland

AAQ NEPM standard 0.20 ppm (1-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	88.2*	0	0.049	0.030	0.024	0.018	0.014
1994	98.9	0	0.033	0.027	0.025	0.021	0.017
1995	*59.5**	*0*	*0.041*	*0.029*	*0.027*	*0.020*	*0.014*
1996	88.3*	0	0.047	0.037	0.027	0.023	0.017
1997	97.0	0	0.047	0.040	0.035	0.023	0.019
1998	95.9	0	0.090	0.037	0.033	0.024	0.019
1999	96.4	0	0.070	0.035	0.033	0.028	0.021
2000	89.9	0	0.081	0.049	0.036	0.027	0.022

2001	99.5	0	0.053	0.048	0.043	0.029	0.023
2002	97.0	0	0.057	0.035	0.033	0.025	0.018
2003	96.4	0	0.046	0.031	0.030	0.023	0.017
2004	99.5	0	0.063	0.036	0.031	0.021	0.016

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 41: Daily peak 1-hour sulfur dioxide summary 1991 to 2004

Trend station/region: South Gladstone, Gladstone

AAQ NEPM standard 0.20 ppm (1-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1991	92.6	0	0.011	0.011	0.009	0.008	0.006
1992	94.3	0	0.052	0.039	0.029	0.020	0.015
1993	98.3	0	0.075	0.059	0.050	0.039	0.032
1994	97.0	0	0.070	0.042	0.040	0.031	0.024
1995	96.7	0	0.168	0.083	0.065	0.047	0.035
1996	99.2	0	0.083	0.053	0.042	0.026	0.018
1997	98.9	0	0.049	0.029	0.023	0.014	0.010
1998	97.5	0	0.076	0.050	0.042	0.027	0.020
1999	94.2	0	0.051	0.042	0.039	0.027	0.022
2000	84.7*	0	0.092	0.071	0.045	0.034	0.024
2001	98.1	0	0.068	0.046	0.035	0.023	0.018
2002	94.5	0	0.123	0.040	0.031	0.025	0.020
2003	93.2	0	0.112	0.058	0.041	0.025	0.019
2004	96.4	0	0.064	0.040	0.032	0.022	0.017

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 42: Daily peak 1-hour sulfur dioxide summary 1983 to 2004

Trend station/region: Menzies, Mount Isa

AAQ NEPM standard 0.20 ppm (1-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1983	*67.4**	*25*	*0.725*	*0.515*	*0.430*	*0.270*	*0.200*
1984	93.7	31	1.155	0.555	0.515	0.330	0.185
1985	97.3	7	1.080	0.325	0.210	0.100	0.055
1986	88.5	50	1.406	1.255	0.788	0.577	0.296
1987	98.9	51	1.755	1.016	0.853	0.546	0.324
1988	91.0*	31	0.798	0.682	0.562	0.342	0.159
1989	85.2	41	0.957	0.585	0.503	0.348	0.241
1990	*44.7**	*6*	*0.577*	*0.493*	*0.222*	*0.145*	*0.091*
1991	*54.8**	*28*	*0.673*	*0.638*	*0.440*	*0.294*	*0.215*
1992	88.5*	25	0.540	0.457	0.406	0.286	0.170
1993	95.6	24	0.718	0.434	0.403	0.282	0.134
1994	91.5	20	0.688	0.483	0.343	0.250	0.135
1995	98.9	11	0.443	0.254	0.239	0.184	0.109
1996	98.6	16	0.598	0.409	0.285	0.198	0.131
1997	98.9	7	0.300	0.256	0.216	0.128	0.083
1998	*48.8**	*16*	*0.693*	*0.548*	*0.368*	*0.265*	*0.190*
1999	90.4*	17	0.675	0.366	0.269	0.202	0.141
2000	96.4	31	0.584	0.373	0.357	0.250	0.191
2001	98.9	41	0.581	0.438	0.422	0.295	0.222

2002	91.2	49	1.254	0.551	0.526	0.385	0.272
2003	98.9	42	0.658	0.503	0.493	0.312	0.217
2004	97.5	36	0.888	0.665	0.444	0.302	0.207

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 43: Daily 24-hour sulfur dioxide summary 1993 to 2004

Trend station/region: Flinders View, south-east Queensland

AAQ NEPM standard 0.08 ppm (24-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1993	88.2*	0	0.006	0.005	0.005	0.004	0.003
1994	98.9	0	0.008	0.007	0.006	0.006	0.005
1995	*59.5**	*0*	*0.009*	*0.008*	*0.006*	*0.005*	*0.004*
1996	88.3*	0	0.010	0.005	0.005	0.004	0.004
1997	97.0	0	0.009	0.006	0.005	0.004	0.003
1998	95.9	0	0.011	0.007	0.006	0.004	0.004
1999	96.4	0	0.009	0.007	0.007	0.005	0.004
2000	89.9	0	0.013	0.012	0.008	0.006	0.005
2001	99.5	0	0.014	0.007	0.006	0.004	0.003
2002	97.0	0	0.006	0.006	0.005	0.003	0.003
2003	96.4	0	0.006	0.005	0.004	0.003	0.002
2004	99.5	0	0.007	0.006	0.005	0.003	0.003

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 44: Daily 24-hour sulfur dioxide summary 1991 to 2004

Trend station/region: South Gladstone, Gladstone

AAQ NEPM standard 0.08 ppm (24-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1991	92.6	0	0.007	0.006	0.006	0.004	0.004
1992	94.3	0	0.012	0.011	0.010	0.009	0.008
1993	98.3	0	0.014	0.010	0.010	0.008	0.007
1994	97.0	0	0.013	0.007	0.007	0.006	0.005
1995	96.7	0	0.017	0.014	0.012	0.008	0.007
1996	99.2	0	0.010	0.007	0.006	0.005	0.004
1997	98.9	0	0.007	0.004	0.003	0.002	0.002
1998	97.5	0	0.012	0.010	0.007	0.005	0.003
1999	94.2	0	0.009	0.008	0.006	0.005	0.004
2000	84.7*	0	0.022	0.008	0.006	0.004	0.003
2001	98.1	0	0.006	0.005	0.004	0.003	0.002
2002	94.5	0	0.029	0.029	0.006	0.004	0.003
2003	93.2	0	0.013	0.011	0.007	0.005	0.003
2004	96.4	0	0.007	0.006	0.006	0.004	0.003

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 45: Daily 24-hour sulfur dioxide summary 1984 to 2004

Trend station/region: Menzies, Mount Isa

AAQ NEPM standard
0.08 ppm (24-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)
1984	93.7	3	0.094	0.087	0.071	0.053	0.033
1985	97.3	1	0.111	0.050	0.042	0.030	0.024
1986	88.5	11	0.145	0.123	0.101	0.071	0.052
1987	98.9	12	0.158	0.110	0.099	0.060	0.044
1988	91.0*	3	0.123	0.091	0.064	0.041	0.032
1989	85.2	1	0.100	0.066	0.062	0.048	0.035
1990	*44.7**	*1*	*0.088*	*0.078*	*0.072*	*0.052*	*0.046*
1991	*54.8**	*3*	*0.117*	*0.100*	*0.073*	*0.053*	*0.038*
1992	88.5*	0	0.064	0.056	0.052	0.033	0.025
1993	95.6	0	0.064	0.052	0.046	0.040	0.027
1994	91.5	2	0.085	0.059	0.054	0.045	0.040
1995	98.9	0	0.049	0.036	0.028	0.018	0.012
1996	98.6	0	0.049	0.043	0.040	0.024	0.015
1997	98.9	0	0.034	0.028	0.022	0.016	0.010
1998	*48.8**	*0*	*0.055*	*0.041*	*0.037*	*0.029*	*0.019*
1999	90.4*	0	0.049	0.036	0.032	0.024	0.015
2000	96.4	0	0.078	0.070	0.055	0.032	0.019
2001	98.9	0	0.075	0.052	0.045	0.033	0.021
2002	91.2	1	0.081	0.057	0.055	0.043	0.033
2003	98.9	2	0.093	0.067	0.057	0.036	0.022
2004	97.5	1	0.100	0.069	0.050	0.034	0.017

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

Table 46: Daily 24-hour PM_{10} summary 1997 to 2004

Trend station/region: Rocklea, south-east Queensland

AAQ NEPM standard
50 µg/m³ (24-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (µg/m³)	99th percentile (µg/m³)	98th percentile (µg/m³)	95th percentile (µg/m³)	90th percentile (µg/m³)
1997	92.1	0	45.8	42.7	32.1	28.9	26.5
1998	90.1	0	34.7	32.4	29.1	25.7	23.3
1999	96.4	1	56.7	31.6	30.4	25.5	22.3
2000	92.3	0	47.6	40.6	38.1	32.8	27.0
2001	97.3	1	69.5	35.2	34.2	27.2	24.4
2002	99.2	8	177.2	95.3	60.1	35.0	30.9
2003	98.1	2	119.9	41.7	33.6	28.2	24.2
2004	92.6	2	52.4	44.5	39.9	33.5	28.8

Table 47: Daily 24-hour PM_{10} summary 1999 to 2004

Trend station/region: Flinders View, south-east Queensland

AAQ NEPM standard 50 µg/m³ (24-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (µg/m³)	99th percentile (µg/m³)	98th percentile (µg/m³)	95th percentile (µg/m³)	90th percentile (µg/m³)
1999	95.3	0	44.2	28.4	25.5	20.3	17.9
2000	97.3	1	61.1	42.3	38.5	32.0	26.4
2001	99.7	0	42.5	37.5	35.0	25.5	22.9
2002	97.3	7	197.2	103.3	60.8	35.9	31.8
2003	94.8	1	119.1	35.1	30.5	26.0	23.0
2004	99.2	3	64.1	40.8	38.5	32.9	28.9

Table 48: Daily 24-hour PM_{10} summary 2001 to 2004

Trend station/region: South Gladstone, Gladstone

AAQ NEPM standard 50 µg/m³ (24-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (µg/m³)	99th percentile (µg/m³)	98th percentile (µg/m³)	95th percentile (µg/m³)	90th percentile (µg/m³)
2001	95.6	4	66.6	51.6	36.0	30.3	25.9
2002	98.1	5	197.0	83.0	48.5	33.8	26.3
2003	96.4	0	41.3	35.5	33.1	26.2	23.2
2004	99.7	0	42.7	35.6	30.0	25.6	22.4

Table 49: Daily 24-hour $PM_{2.5}$ summary 1998 to 2004

Trend station/region: Rocklea, south-east Queensland[a]

AAQ NEPM advisory standard 25 µg/m³ (24-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (µg/m³)	99th percentile (µg/m³)	98th percentile (µg/m³)	95th percentile (µg/m³)	90th percentile (µg/m³)
1998	80.1*	0	16.1	11.1	9.2	7.8	6.2
1999	88.8*	0	14.5	13.3	12.4	10.3	8.3
2000	96.4	3	37.4	20.2	17.7	14.1	10.8
2001	98.1	3	100.7	21.6	17.4	12.5	9.3
2002	94.2	3	47.3	26.0	17.9	13.4	11.1
2003	87.7	1	33.1	23.3	13.9	10.5	8.6
2004	94.5	5	29.7	28.7	22.5	17.2	11.6

[a]Monitoring by TEOM instrumentation in accordance with Technical Paper on Monitoring for Particles as $PM_{2.5}$

*Data availability less than 75 percent for one or more quarters.

Table 50: Daily 24-hour $PM_{2.5}$ summary 1999 to 2004

Trend station/region: Springwood, south-east Queensland[a]

AAQ NEPM advisory standard 25 µg/m³ (24-hour average)

Year	Data availability (%)	No. of exceedences (days)	Max conc. (µg/m³)	99th percentile (µg/m³)	98th percentile (µg/m³)	95th percentile (µg/m³)	90th percentile (µg/m³)
1999	83.5*	0	22.3	12.9	12.0	8.7	7.1

2000	97.0	6	33.5	29.0	23.6	17.4	12.9
2001	96.2	0	19.4	18.0	16.2	11.8	9.1
2002	94.2	5	38.9	30.6	20.1	15.4	11.7
2003	96.2	0	20.5	16.2	15.4	10.9	9.3
2004	98.6	0	21.7	16.8	15.4	11.6	9.5

[a]Monitoring by TEOM instrumentation in accordance with Technical Paper on Monitoring for Particles as $PM_{2.5}$

*Data availability less than 75 percent for one or more quarters.

Table 51: Annual lead summary 1980 to 2002

Trend station/region: Woolloongabba, south-east Queensland

AAQ NEPM standard 0.5 µg/m³ (annual average)

Year	Data availability (%)	Annual average (µg/m³)
1980	91.8	2.21
1981	85.2*	2.69
1982	96.7	2.34
1983	96.7	2.21
1984	93.4	2.56
1985	86.9*	2.40
1986	100.0	1.90
1987	96.7	1.91
1988	98.4	2.13
1989	98.4	1.64
1990	98.4	1.47
1991	100.0	0.97
1992	90.2	0.63
1993	93.4	0.57
1994	96.7	0.48
1995	100.0	0.38
1996	98.4	0.25
1997	100.0	0.27
1998	*65.6*	*0.22*
1999	98.3	0.19
2000	88.5	0.14
2001	93.4	0.03
2002	96.7	0.02

*Data availability less than 75 percent for one or more quarters. Years shown in italics have less than 75 percent annual data availability.

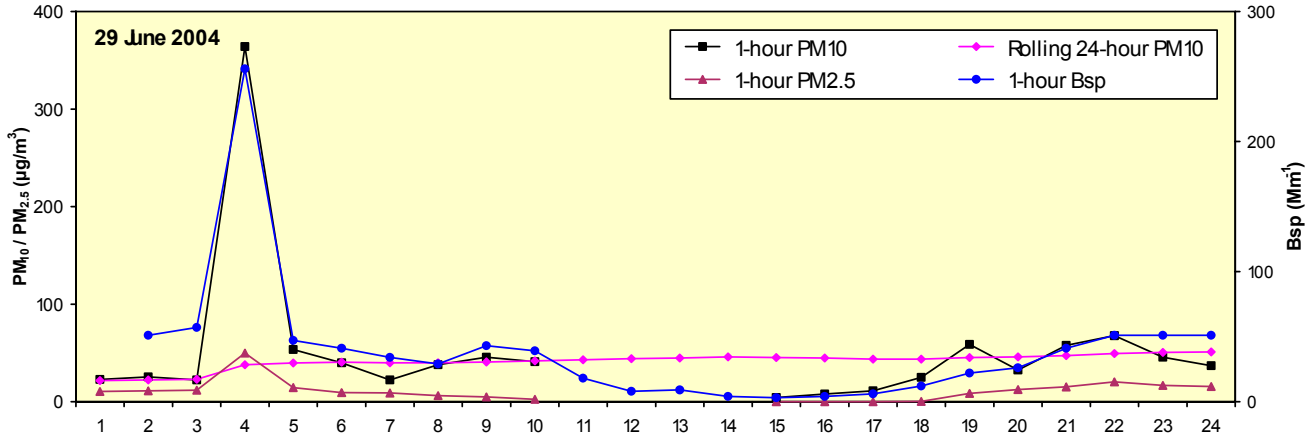
Appendix – Description of 2004 exceedence events

PM_{10} exceedence at Rocklea on 29 June 2004

There was a fire at the Dulux Australia premises situated approximately 1km east of the Rocklea monitoring site during the early hours of 29 June. Smoke from this fire travelled over the Rocklea site between 3:00am and 4:00am, leading to very high PM_{10} levels during this period (figure 2).

Elevated $PM_{2.5}$ and Bsp (nephelometer) measurements at the same time confirm a high proportion of fine particles, consistent with the presence of smoke particles.

Figure 2: Particle concentrations at the Rocklea site on 29 June 2004.


29 June 2004
1-hour PM10
Rolling 24-hour PM10
1-hour PM2.5
1-hour Bsp
PM10 / PM2.5 (µg/m3)
Bsp (Mm-1)
400
300
200
100
0
300
200
100
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
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21
22
23
24

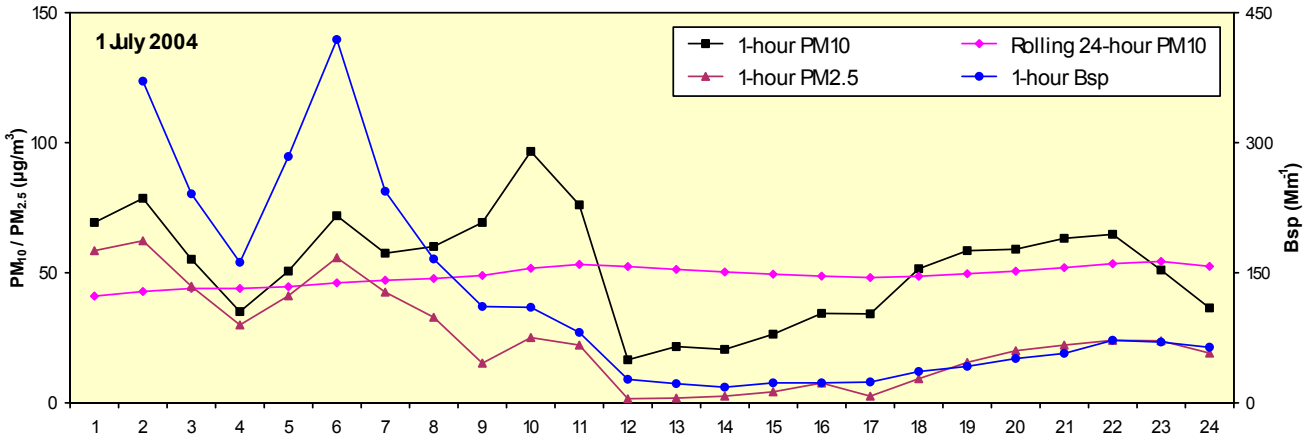
PM_{10} exceedence at Rocklea on 1 July 2004

Good rainfall in south-east Queensland in early 2004, followed by a dry winter, led to an increased fuel load in bushland areas in the region. To reduce the bushfire risk in summer months, a number of hazard-reduction burns were conducted by land management authorities during winter to reduce the amount of dry grass and wood.

A hazard-reduction burn of a four square kilometre section of the Gold Creek catchment in Brisbane Forest Park was conducted on 30 June. Smoke from this burn became trapped close to the ground under a temperature inversion overnight, leading to an exceedence of the AAQ NEPM PM_{10} standard at the Rocklea site on 1 July.

Elevated $PM_{2.5}$ and Bsp (nephelometer) measurements at the same time confirm a high proportion of fine particles, consistent with the presence of smoke particles (figure 3).

Figure 3: Particle concentrations at the Rocklea site on 1 July 2004.



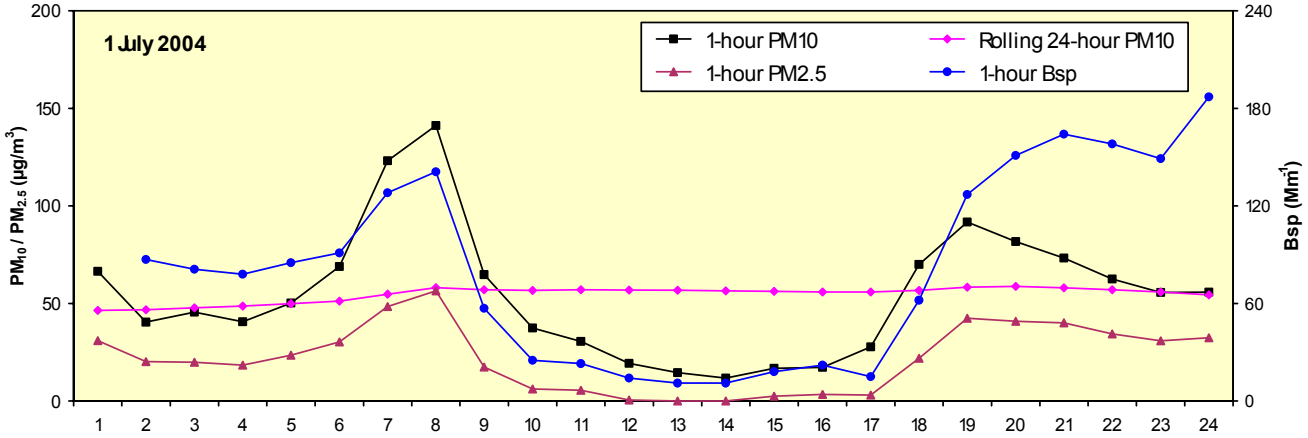
PM_{10} exceedence at North Toowoomba on 1 July 2004

Solid fuel heaters are used extensively in Toowoomba for residential heating during winter months. On 1 July smoke from this source was primarily responsible for an exceedence of the AAQ NEPM PM_{10} standard at the North Toowoomba monitoring site. As figure 4 shows, the highest PM_{10} concentrations on this day occurred in the early morning and early evening, consistent with the times of greatest residential solid fuel heater use.

Good correlation between PM_{10} and both $PM_{2.5}$ and Bsp (nephelometer) measurements on 1 July confirm a high proportion of fine particles, consistent with the presence of smoke particles.

Given the presence of controlled burning in other areas of south-east Queensland around this time it is possible that hazard-reduction burns could have contributed to overall PM_{10} levels on this day, although there is no available evidence of local vegetation fires.

Figure 4: Particle concentrations at the North Toowoomba site on 1 July 2004.

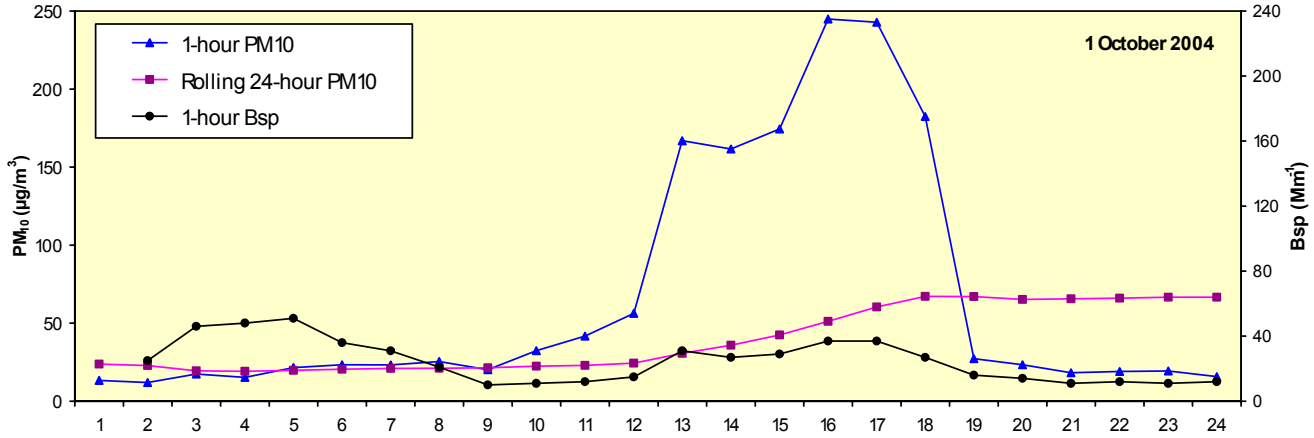


PM_{10} exceedence at Mountain Creek on 1 October 2004

During 2004 a car park was constructed in the grounds of the Cooloola Sunshine TAFE complex less than 200 metres from the Mountain Creek monitoring station. Windblown dust from these construction works resulted in an exceedence of the PM_{10} standard on 1 October. Figure 5 shows that 1-hour average PM_{10} concentrations on 1 October were elevated between 1:00pm and 6:00pm.

This period corresponds with the onset of the afternoon north-easterly sea breeze which carried soil particles from the construction site over the monitoring station. Bsp (nephelometer) readings remained low, indicating that coarse soil particles, rather than smaller combustion particles from motor vehicles or vegetation burning, made up the majority of the PM_{10} fraction during this episode.

Figure 5: Particle concentrations at the Mountain Creek site on 1 October 2004.



Ozone, PM_{10} and $PM_{2.5}$ exceedences at Rocklea and Flinders View during October 2004

High temperatures, low humidity and strong winds led to numerous grass and bushfires in south-east Queensland during October. The first grass and bushfires were reported on 2 October and there were major fires at Nanango, Kilcoy, Esk, Crows Nest and the Gold Coast hinterland. This fire activity and the absence of significant rainfall meant that background particle levels were much higher than normal during the month.

Ozone, PM_{10} and $PM_{2.5}$ exceedences between 8 October and 24 October can be attributed to emissions of ozone precursor compounds and particles from these fires.

A large bushfire (over 3000ha) started at Wongawallan, between Brisbane and the Gold Coast, on 7 October and burned for three days. South-easterly winds transported smoke from this fire over the Rocklea and Flinders View sites, leading to exceedences of the 24-hour $PM_{2.5}$ advisory standard at Rocklea on both 8 October and 9 October and an exceedence of the PM_{10} standard at Flinders View on 9 October (figure 6).

Northerly winds on 13 October transported emissions from an extensive fire at Kilcoy (over 260 000ha burnt out) over the Flinders View monitoring site. Favourable meteorological conditions, together with the presence of additional ozone precursor compounds generated by the Kilcoy fire, led to an exceedence of the 1-hour ozone standard at Flinders View on the afternoon of 13 October (figure 7).

On 15 October fires were reported to the north, west and south of Brisbane. Particle levels were elevated at the Rocklea site from 7:00am (figure 8), culminating in an exceedence of the 24-hour $PM_{2.5}$ advisory standard.

On 23-24 October further fire outbreaks occurred at many places across south-east Queensland, including Esk, Browns Plains, Sandy Creek/Kilcoy, Beachmere, Jimboomba and Nanango. Smoke from the large fire at Esk led to elevated particle levels at the Flinders View and Rocklea sites on 23 October, resulting in an exceedence of the 24-hour $PM_{2.5}$ advisory standard at Rocklea and an exceedence of the PM_{10} standard at Flinders View (figure 9). North-easterly winds on 24 October transported smoke particles back over the two sites, once again leading to an exceedence of the 24-hour $PM_{2.5}$ advisory standard at Rocklea and an exceedence of the PM_{10} standard at Flinders View. In addition, conducive meteorological conditions and added ozone precursor compounds generated by the fires resulted in an exceedence of both

the 1-hour and 4-hour ozone standards at Flinders View (figure 9).

Figure 6: Particle concentrations at the Rocklea and Flinders View sites on 8-9 October 2004.

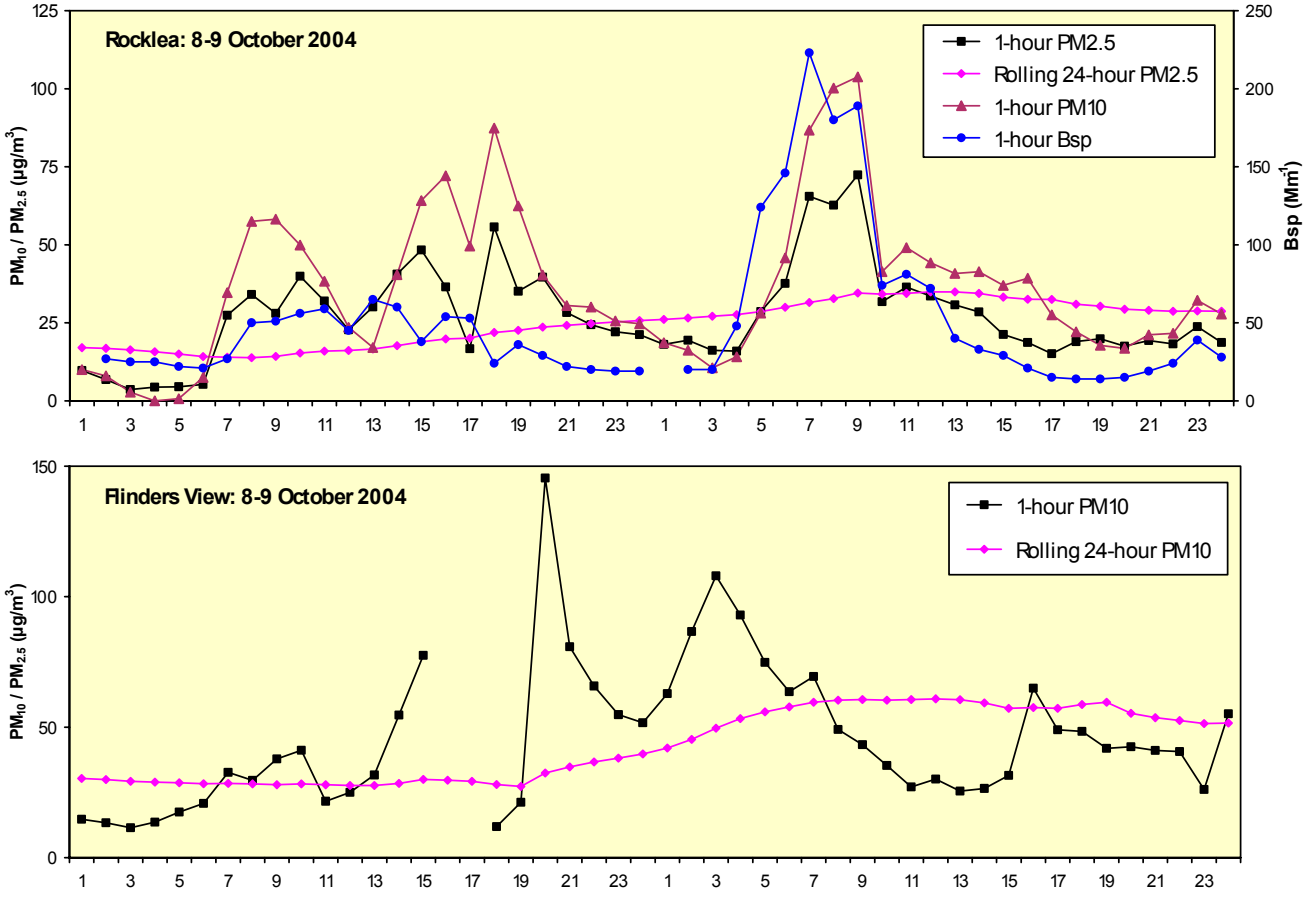


Figure 7: Ozone and particle concentrations at the Flinders View site on 13 October 2004.

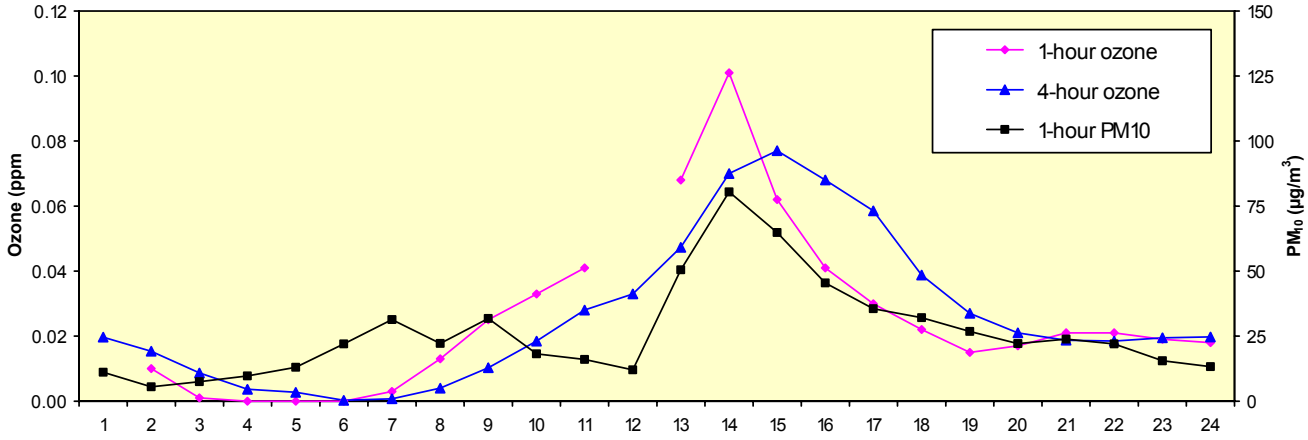


Figure 8: Particle concentrations at the Rocklea site on 15 October 2004.

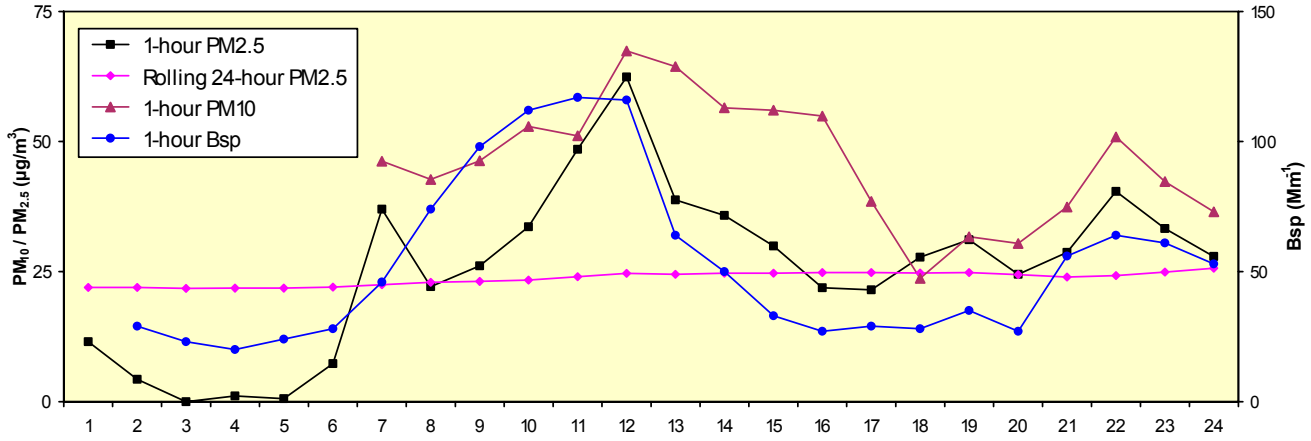
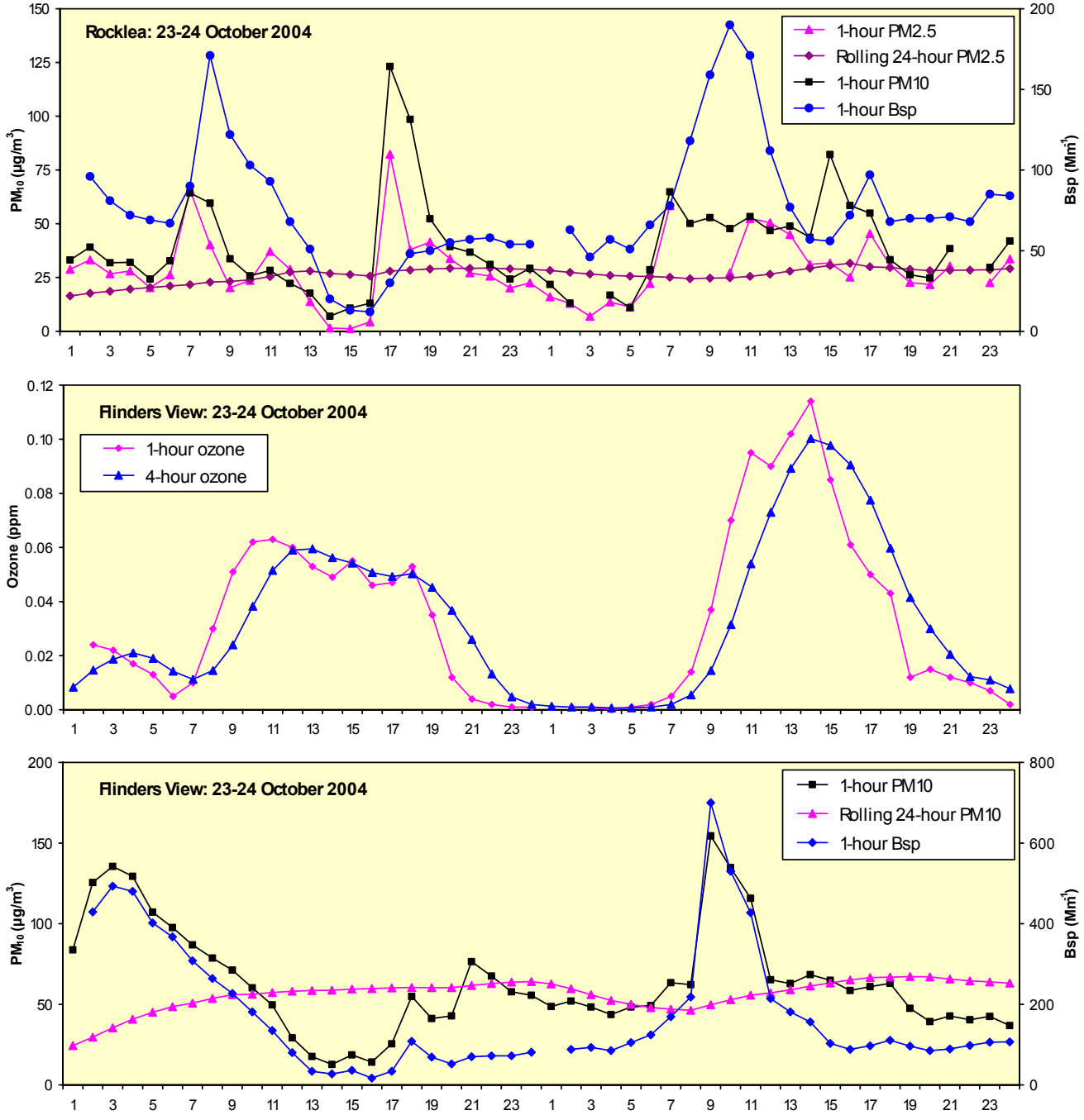


Figure 9: Ozone and particle concentrations at the Rocklea and Flinders View sites on 23-24 October 2004.

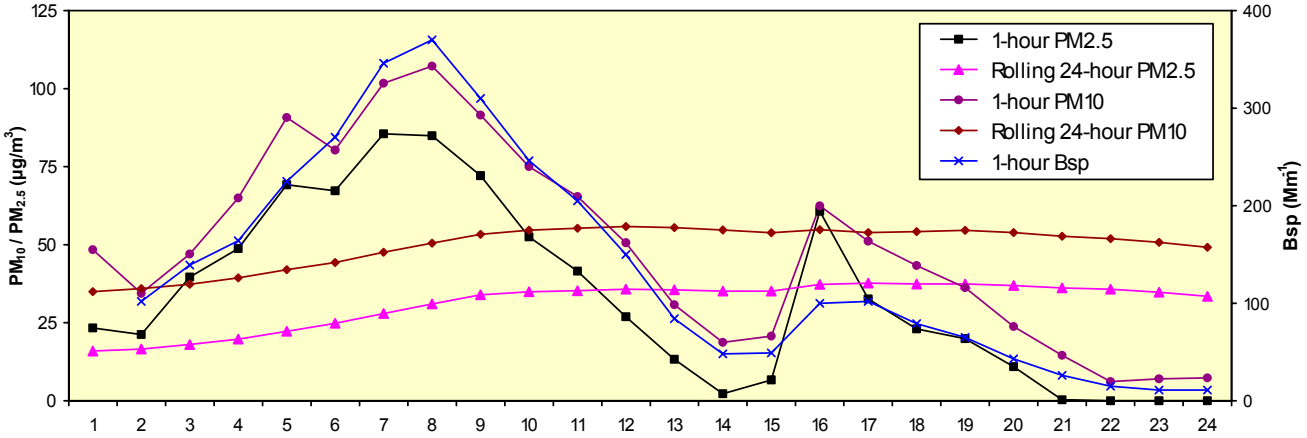


$PM_{2.5}$ exceedence at North Toowoomba on 25 October 2004

Elevated particle concentrations were measured at the North Toowoomba site on the morning of 25 October and resulted in an exceedence of the 24-hour $PM_{2.5}$ advisory standard on this day. Good correlation between PM_{10}, $PM_{2.5}$, and Bsp (nephelometer) measurements (figure 10) indicates the presence of smoke particles.

While there was a major fire burning at Nanango, north of Toowoomba, at this time, winds at the time were westerly, suggesting a local unidentified fire as a more likely cause of these elevated levels.

Figure 10: Particle concentrations at the North Toowoomba site on 25 October 2004.



Sulfur dioxide exceedences at Menzies in 2004

Industrial operations (metals smelting and sulfuric acid manufacture) emit sulfur dioxide into the atmosphere in Mount Isa. Under the *Mount Isa Mines Agreement Act 1985*, smelter operations must be managed to maintain ambient sulfur dioxide concentrations in Mount Isa below the levels specified in the Act (these are currently equivalent to the USEPA three-hour secondary, 24-hour primary and annual average primary sulfur dioxide standards). As smelter operations are only controlled to meet *Mount Isa Mines Agreement Act 1985* air quality limits, sulfur dioxide levels can exceed the more stringent Air NEPM one-hour and 24-hour standards on occasions.

The smelter and sulfuric acid manufacturing plant are situated to the south-southwest of the Menzies monitoring site. The relationship between wind direction and one-hour average sulfur dioxide concentrations greater than 0.200ppm (figure 11) demonstrates that exceedences predominantly occur when the wind is blowing from these plants towards the Menzies site.

Figure 11: Relationship between wind direction and 1-hour average sulfur dioxide concentrations at the Menzies site during 2004.